1.1 MEBT

The purpose of the Medium Energy Beam Transport (MEBT) is to match the beam from the RFQ to the IH structure in all three planes (two transverse, and longitudinal). The RFQ has a FODO lattice with 1 $\beta\lambda$ period and IH structure has quadrupole triplet focusing. The RFQ and the IH structure have the same RF frequency of 101.28 MHz. Table1 shows the Twiss parameters at output of the RFQ and input of the IH structure.

Table1 Twiss parameters at the end of the RFQ and entrance of the IH structure.

Parameter	End of RFQ	Entrance of IH	units
α_x	-0.458	1.80221	
β_x	0.18394	1.01	mm/mrad
ε_x (90%,unnorm)	24.0	24	π mm mrad
α_y	-0.37989	0.60246	
β_y	0.24016	0.59391	mm/mrad
ε_y (90%, unnorm)	22.0	22	π mm mrad
α_z	0.054	0.37	
β_z	0.0203	0.024	deg/keV
ε_z (90%)	34168	34168	π keV deg

The MEBT requires 6 controllable elements to match the beam in all three planes, four in the transverse plane and two in the longitudinal plane. Because the RFQ is a strong focusing structure, the beam from the RFQ is highly divergent in one transverse plane and highly convergent in the other transverse plane. After passing the RFQ high energy endflange, gate valve, and a current transformer, the beam has usually become divergent in the both planes by the time it reaches the first quadrupole. To avoid this problem we will modify the RFQ electrodes such that beam Twiss parameters will be as shown in Table 1 There are four quadrupoles to provide four degrees of freedom in the transverse plane. In the longitudinal plane we use one buncher and the position of the buncher to match the beam to the IH structure. Thus we have 5 active controls to match beam instead of six. Figure 1 shows the TRACE3D output for the MEBT. There is enough space in the MEBT to accommodate the diagnostics.

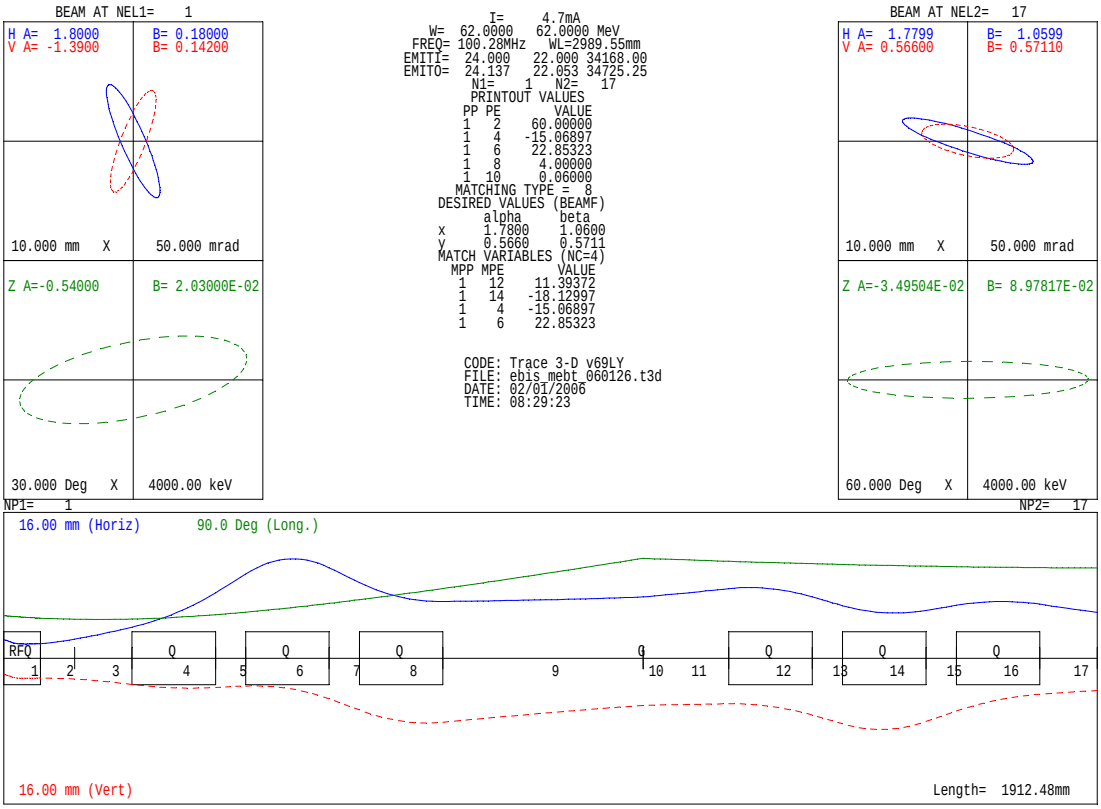

Figure 1 TRACE3D output showing the MEBT optics

The quadrupoles from LANL CCDTL will be used in the MEBT these quad are 45 mm (iron length) long and has a radius of 16 mm. The maximum gradient for these quadruples is about 4.459 T/m. We have used two quadrupoles (measured length 146 mm) as one,

There are six quadrupoles shown in the figure one, we really need 12 of them. These quadrupoles are configured as triplets; therefore we will need four power supplies. The 100mm spaces are provided for gate and current monitors at the both ends of the MEBT. There is 200 mm space for buncher and 200mm space for the diagnostics box in the middle of the MEBT.